Kentucky Geological Survey
James C. Cobb, State Geologist and Director
UNIVERSITY OF KENTUCKY, LEXINGTON

Generalized Geologic Map for Land-Use Planning: Webster County, Kentucky

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MAP AND CHART 86
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The Land

Agriculture is a major part of the Webster County economy. According to the Kentucky Agricultural Statistics Service, 72,528 acres (34 percent) of the 215,161 acres available were planted in corn, soybeans and tobacco in 2002-03. Photograph by Glynn Beck, Kentucky Geological Survey.

Along with row crop agriculture, harvesting hardwood trees for furniture and pulp is a sustained land use in Webster County. Photograph by Glynn Beck, Kentucky Geological Survey.

Approximately 190 chicken houses are in Webster County. Each house holds five to six flocks per year. One flock equals about 27,000 birds. Chicken litter associated with these operations is used as a substitute for synthetic fertilizers on row crop fields. Proper nutrient management is extremely important to ensure that local soil and water resources are not impaired. Photo by Glynn Beck, Kentucky Geological Survey.

Water Resources

According to the Kentucky Agricultural Statistics Service, there are 96 acres of surface water in Webster County. Walker Lake, pictured above, is an 86-acre private lake, and accounts for approximately 90 percent of the total. Photo by Glynn Beck, Kentucky Geological Survey.

Groundwater

In Webster County, most wells that penetrate sandstone formations to depths less than 300 feet are adequate for a domestic supply. In the highlands of the northwestern part of the county, in the old Camp Breckinridge area, only a few wells yield enough water for a domestic supply. In a thin highly faulted zone running east-west across the county between the towns of Sebree and Tilden, yields to drilled wells are unpredictable because of faulting.

Generally, groundwater is hard to very hard, and iron and salt may be present in objectionable amounts. Often groundwater becomes saltier with depth. For more information on groundwater in the county see Carey and Stickney (2001).

For Planning Use Only

This map is not intended to be used for selecting individual sites. Its purpose is to inform land-use planners, government officials, and the public in a general way about geologic bedrock conditions that affect the selection of sites for various purposes. The properties of thick soils may supercede those of the underlying bedrock and should be considered on a site-to-site basis. At any site, it is important to understand the characteristics of both the soils and the underlying rock. For further assistance, contact the Kentucky Geological Survey, Western Kentucky Office, 1401 Corporate Court, Henderson, KY 42420, phone 270.827.3414 or 270.827.3404. For more information, and to make custom maps of your local area, visit our Land-Use Planning Internet Mapping Web Site at kgsmap.uky.edu/website/kyluplan/viewer.htm.

Acknowledgments

Geology adapted from Ashcraft (2003), Mullins (2003a,b), Smith (2003a,b), Solis and Hettinger (2000), Solis and Terry (2000a,b), Solis and Venard (2000a-e), and Tyra (2003). Special thanks to Vicki Shadrick, Webster County Agriculture and Natural Resources agent, and Vision Mine No. 9 coal mine for photographic assistance.

Geologic Hazards

The most prominent geologic hazard for Webster County is flooding. Areas underlain by alluvium, unit 1 on the map, are subject to regular flooding. Urban development often exacerbates flooding, and therefore potential flooding should always be considered in urban development plans. Areas of steepwalled drainage, such as that formed in terrain underlain by units 3, 4, 5, and 6, are conducive to flash flooding, especially in developed areas. Flood information is available from the Kentucky Division of Water, Flood Plain Management Branch (www.water.ky.gov/floods/).

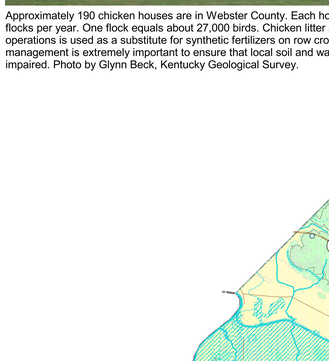
None of the faults in Webster County are considered to be active; however, the proximity of active seismic zones, such as the New Madrid, Wabash, or East Tennessee, calls for precautions to be taken for earthquake damage mitigation. The presence of thick alluvium, which normally has a high water table, should also be treated with special concern, because of the possibility of augmented shaking and liquefaction during a strong earthquake. In addition, alluvium often contains high amounts of clay minerals, which can give soil a high shrink/swell capacity.

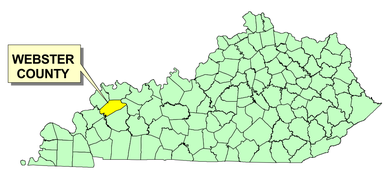
Steep slopes are present, especially along streams, in areas underlain by units 3, 4, 5, and 6 throughout the county. Steep slopes can develop soil creep and landslides if not properly treated during development. Proper engineering techniques should be followed when developing on hillsides, and care should be taken not to affect property above and below a development site on a hillside.

Several underground coal mines are located in Webster County. The locations of known mine workings and shafts are shown on the map. Precautions need to be taken when developing over old mined areas, because of the possibility of mine subsidence. Mine subsidence insurance is available in Kentucky. Abandoned mine boundaries shown on the map are approximate and do not represent all the mining that has occurred in the county.

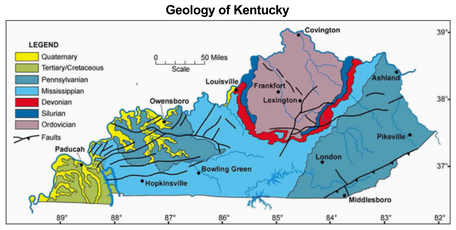
Henderson County
Union County
McLean County
Hopkins County
Crittenden County

Poole
Pratt
Tilden
Wanamaker
Sebree Elementary
SEBREE
Steamport Landing
Roland Landing
BREATHITT PARKWAY
Shelton
Ortiz
Breton
Onton
Little Zion
Hearin
Williams
Free Union
DIXON
Gatesville
Elmwood
Dixon Elementary
WCALC
WCHS
Rock Spring
West Wheatcroft
WHEATCROFT
Vanderburg
Slaughters Elementary
SLAUGHTERS
CLAY
Clay Elementary
Virginia
Derby
Fairmont
Jolly
Lisman
Blackford
Stanhope
Diamond
PROVIDENCE
Bellville





Geology of Kentucky



Learn more about Kentucky geology at www.uky.edu/kgs/geoky/

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Scale 1:63,360

1 inch equals 1 mile

1 0 1 2 3 Miles

PLANNING TABLE DEFINITIONS

FOUNDATION AND EXCAVATION

The terms "earth" and "rock" excavation are used in the engineering sense; earth can be excavated by hand tools, whereas rock requires heavy equipment or blasting to remove.

LIMITATIONS

Slight—A slight limitation is one that commonly requires some corrective measure but can be overcome without a great deal of difficulty or expense.

Moderate—A moderate limitation is one that can normally be overcome but the difficulty and expense are great enough that completing the project is commonly a question of feasibility.

Severe—A severe limitation is one that is difficult to overcome and commonly is not feasible because of the expense involved.

LAND USES

Septic tank disposal system—A septic tank disposal system consists of a septic tank and a filter field. The filter field is a subsurface tile system laid in such a way that effluent from the septic tank is distributed with reasonable uniformity into the natural soil.

Residences—Ratings are made for residences with and without basements because the degree of limitation is dependent upon ease and required depth of excavation. For example, excavation in limestone has greater limitation than excavation in shale for a house with a basement.

Highways and streets—Refers to paved roads in which cuts and fills are made in hilly topography, and considerable work is done preparing subgrades and bases before the surface is applied.

Access roads—These are low-cost roads, driveways, etc., usually surfaced with crushed stone or a thin layer of blacktop. A minimum of cuts and fills are made, little work is done preparing a subgrade, and generally only a thin base is used. The degree of limitation is based on year-around use and would be less severe if not used during the winter and early spring. Some types of recreation areas would not be used during these seasons.

Light industry and malls—Ratings are based on developments having structures or equivalent load limit requirements of three stories or less, and large paved areas for parking lots. Structures with greater load limit requirements would normally need footings in solid rock, and the rock would need to be core drilled to determine the presence of caverns, cracks, etc.

Intensive recreation—Athletic fields, stadiums, etc.

Extensive recreation—Camp sites, picnic areas, parks, etc.

Reservoir areas—The floor of the area where the water is impounded. Ratings are based on the permeability of the rock.

Reservoir embankments—The rocks are rated on limitations for embankment material.

Underground utilities—Included in this group are sanitary sewers, storm sewers, water mains, and other pipes that require fairly deep trenches.

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Public Information Center
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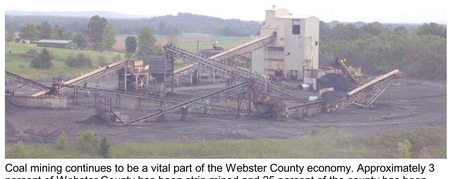
www.uky.edu/kgs

Coal



Coal mining continues to be a vital part of the Webster County economy. Approximately 3 percent of Webster County has been strip mined and 25 percent of the county has been deep mined for coal. Photo by Glynn Beck, Kentucky Geological Survey.

Topography

The topography of Webster County ranges from flat, narrow lowlands to very steep-sloped uplands. The elevation ranges from 340 to 630 feet above mean sea level. Photo by Glynn Beck, Kentucky Geological Survey.

Residential Development

According to the U.S. Census Bureau, the population of Webster County grew 1.2 percent between 1990 and 2000. New home construction has recently become a growing land use in certain parts of the county. Photo by Glynn Beck, Kentucky Geological Survey.

Planning Guidance by Rock Unit Type

Rock Unit	Foundation and Excavation	Septic Tank Disposal System	Residence with Basement	Highways and Streets	Access Roads	Light Industry and Malls	Intensive Recreation	Extensive Recreation	Reservoir Areas	Reservoir Embankments	Underground Utilities
1. Alluvium	Fair to good foundation material. Easily excavated.	Refer to soil report (Jacobs, 1981).	Refer to soil report (Jacobs, 1981).	Refer to soil report (Jacobs, 1981).	Refer to soil report (Jacobs, 1981).	Refer to soil report (Jacobs, 1981).	Refer to soil report (Jacobs, 1981).	Refer to soil report (Jacobs, 1981).	Refer to soil report (Jacobs, 1981).	Refer to soil report (Jacobs, 1981).	Refer to soil report (Jacobs, 1981).
2. Loess	Fair to good foundation material. Easily excavated.	Slight to moderate limitations. Variable thickness and permeability.	Severe limitations. Shallow water table may be present.	No limitations.	No limitations.	No limitations.	No limitations.	No limitations.	Slight limitations.	Slight limitations.	No limitations.
3. Shale, siltstone, sandstone, limestone, coal, and underclay *	Fair to good foundation material. Moderately difficult excavation.**	Severe limitations. Thin soils and impermeable rock.	Severe to moderate limitations. Rock excavation; locally, upper few feet may be rippable. Steep slopes.	Severe limitations. Rock excavation; locally, upper few feet may be rippable. Steep slopes.**	Moderate limitations. Rock excavation. Steep slopes.	Severe limitations. Rock excavation; locally, upper few feet may be rippable. Steep slopes.**	Severe limitations. Steep slopes.	Slight to moderate limitations.	Slight limitations. Reservoir might leak where rocks are fractured.	Severe limitations.**	Moderate limitations. Highly variable amount of soil and rock excavation.
4. Sandstone	Fair to good foundation material. Difficult excavation.	Severe limitations. Thin soils.	Severe to moderate limitations. Rock excavation; locally, upper few feet may be rippable. Steep slopes.	Severe limitations. Rock excavation; locally, upper few feet may be rippable. Steep slopes.	Moderate limitations. Rock excavation. Steep slopes.	Severe limitations. Rock excavation. Steep slopes.	Severe limitations. Steep slopes.	Slight to moderate limitations.	Moderate limitations. Permeable rock.	Severe limitations.	Moderate limitations. Highly variable amount of soil and rock excavation. Steep slopes.
5. Limestone and shale	Fair to good foundation material. Difficult excavation.	Severe limitations. Thin soils and impermeable rock.	Severe to moderate limitations. Rock excavation; locally, upper few feet may be rippable. Steep slopes.	Severe limitations. Rock excavation; locally, upper few feet may be rippable. Steep slopes.	Moderate limitations. Rock excavation. Steep slopes.	Severe limitations. Rock excavation; locally, upper few feet may be rippable. Steep slopes.	Severe limitations. Steep slopes.	Slight to moderate limitations.	Slight limitations. Reservoir might leak where rocks are fractured.	Severe limitations.	Moderate limitations. Highly variable amount of soil and rock excavation. Steep slopes.
6. Sandstone, siltstone, thin limestone, shale	Fair to good foundation material. Difficult excavation.	Severe limitations. Thin soils and impermeable rock.	Severe to moderate limitations. Rock excavation; locally, upper few feet may be rippable. Steep slopes.	Severe to moderate limitations. Rock excavation; locally, upper few feet may be rippable. Steep slopes.	Moderate limitations. Rock excavation. Steep slopes.	Severe limitations. Rock excavation; locally, upper few feet may be rippable. Steep slopes.	Severe limitations. Steep slopes.	Slight to moderate limitations.	Slight limitations. Reservoir might leak where rocks are fractured.	Severe limitations.	Moderate limitations. Highly variable amount of soil and rock excavation. Steep slopes.

* This unit may be overlain by loess.
** Coal beds and underclays should not be used for foundations or reservoir embankments because of the presence of expanding pyrite in coal and underclays and the weakness of underclay when it becomes wet.

EXPLANATION

- School
- Urban services boundary
- Wetlands > 1 acre (U.S. Fish & Wildlife Service, 2003)
- Source water protection area, zone 1
- Water
- Underground mining
- Mine shaft
- Watershed divide
- Concealed faults
- Faults
- Projected faults

Water Wells
- Domestic
- Industrial
- Monitoring
- Public
- Spring

Oil and Gas Wells
- Gas well
- Oil and gas well
- Oil well
- Enhanced recovery

20-foot contour interval

Additional Planning Resources

Listed below are Web sites for several agencies and organizations that may be of assistance with landuse planning issues in Webster County:

www.webstercountyky.com/—Webster County
ces.ca.uky.edu/webster—University of Kentucky Cooperative Extension Service
www.gradd.org/—Green River Area Development District
www.thinkkentucky.com/edis/cmnty/cw016/—Kentucky Economic Development Information System
www.uky.edu/KentuckyAtlas/21233.html—Kentucky Atlas and Gazetteer
quickfacts.census.gov/qfd/states/21/21233.html—U.S. Census data
kgsweb.uky.edu/download/kgsplanning.htm—Planning information from the Kentucky Geological Survey

Source Water Protection Areas

Source-water protection areas are areas in which activities are likely to affect the quality of the drinking-water source. For more information, see kgsweb.uky.edu/download/water/swapp/swapp.htm.

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